



Integration Pattern of Biology and Science Learning Based on Islamic Science

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ABSTRACT

The scientific integration paradigm has contributed to education. This study aims to determine the pattern of integration of Biology and science learning based on the integration of Islamic science, through field studies. The research was conducted using semi-structured interviews about experiences in integrating biology and science learning with Islamic sciences. The pattern of integration of Biology and Science based on the integration of Islamic science includes aspects affective and cognitive. Attitudes have a pattern of development such as belief, admiration, humility, gratitude, motivation, and self-awareness. Knowledge has a pattern of connecting scientific knowledge with Islamic knowledge both sourced from the Qur'an and Hadith as well as other Islamic knowledge. Biology and science learning have values that can be developed for the formation of students' character.

Keywords: Learning Integration, Biology, Science, Islamic Science

INTRODUCTION

The paradigm of scientific integration has become a topic of discussion in the world of education. The scientific structure is no longer seen separately between religious science and general science or often known as the dichotomy of science, but all of them have experienced the integration and interconnection of various scientific disciplines. The results of the field study show that several teachers in schools and madrasas have implemented learning that has the integration of science and Islam, but the integration aspect of science and Islam learning does not have a specific explanation in the lesson plan. Erduran (2020) explained that teachers still needed professional development to handle complex arguments concerning science and religious education content.

The implementation of science learning based on the integration of science and Islam is often interpreted in terms of the relationship between phenomena and a verse of

the Qur'an. In general, this is allowed but not necessarily the verse has a specific explanation of the phenomenon. There are verses in the Qur'an that specifically explain science such as the process of creating humans and the universe, but there are also verses that do not specifically explain scientific phenomena such as microorganisms and electricity. Jamaludin (2019) explained that most teachers did not prepare specifically to integrate biological knowledge with Islamic scholarship, especially in teaching materials and learning activities.

Meanwhile, teachers in integrating science and Islam have limitations in mastering verse knowledge, this is an obstacle in the implementation of learning. In addition, there are general types of schools such as junior high schools with diverse religious backgrounds, so that teachers consider linking verses in-class learning. Based on this, it is necessary to study further, how teachers integrate science and Islamic learning. According to Iqbal (2007) that the relationship between Islam and modern science has three areas, namely: epistemological, ontological/metaphysical, and ethical.

Research on how teachers integrate Islam and science is important, so that they can become bottom-up information about the implementation of the integration of science and Islam in schools and madrasas. In addition, this information can be an inspiration for teachers and other researchers about the integration of science and Islamic learning. On the other hand, if science learning is not introduced to an integration of science and Islam, then students can think separately (independently) between understanding science and Islam. Torres et al., (2021) say there is a need to revise science learning in science and its relationship to religion towards a more contextual diversification approach, thus enabling students to make cross-disciplinary connections, to develop a meaningful curriculum.

The idea of integration and interconnection between religious and general knowledge is not a new phenomenon in the epistemology of Islamic scholarship. This is because Islamic teachings do not dichotomy between religious science and general science. The structure of scientific buildings must be placed on the foundation of the Qur'an and Hadith, because in the end, they will become prophetic, such as prophetic natural sciences, prophetic social sciences, and prophetic humanities. If explored further, the idea related to the integration-interconnection between religious knowledge and general science cannot be separated from a long series of struggles for the self-actualization of Muslims against the world modernization process that has taken place on a globalization scale (Fahmi, 2013).

Educators understand the pattern of integrating biology and science learning with Islamic science into something that is needed, firstly to be able to believe that science and religion have the potential to have a relationship and not experience conflict, secondly that in integrating science and religion not only use the verses of the Koran, it will but can develop various spiritual and social attitudes. Hasan & Osama, (2016) explain some of the most important issues in the relationship between Islam and science which have conflicting issues related to epistemology, namely what is the source of Islam (revelation) and science (reason), about the methods used, the main principles underpinning, the scope and limitations of each, the basis for the claim to be true and the source of validity.

Students' questions are posed in debates to stimulate reflection and dialogue about science and religion to illustrate their views and doubts about the themes between science and religion (Paiva et al., 2016). Science and Biology as scientific disciplines are not only a source of knowledge but also a source of values that can be the basis of student education. This makes science teachers have a big role in providing knowledge as well as providing values / ethics to students. This is in line with the 2013 curriculum policy in strengthening the competence of spiritual and social attitudes, knowledge, and skills. The study of how teachers teach spiritual attitudes also needs to be investigated in a review of the integration of science and Islam.

RESEARCH METHODS

The research method uses a qualitative method with the type of case study on biology and science learning based on the integration of Islamic science. The research sample was 6 biology teachers at Madrasah Aliyah (MA) in Kudus Regency and 3 science teachers at Madrasah Tsanawiyah and Junior High Schools. The research was conducted using semi-structured interviews about experiences in integrating biology and science learning with Islamic sciences. The results of the interviews were then grouped into several aspects of integration in learning biology and science with Islamic sciences. The data analysis technique uses descriptive analysis comprehensively, then grouped into an integration pattern of biology and science learning with Islamic science.

RESULTS AND DISCUSSION

The results of interviews with teachers have various patterns, some relate to the verses of the Quran, the creator of Allah, and building a good attitude. Biology and science

learning that has the integration of Islamic Sciences can be done with several aspects of integration such as belief in creation, admiration for creation, a humble attitude that there is the greatness of Allah Almighty, being grateful for all the gifts that Allah has given, linking learning Biology with Islamic Sciences with various sources, both from the Qur'an, hadith and other Islamic sciences, have the motivation to carry out more productive activities based on a belief, gratitude, and knowledge possessed, and have the awareness to have a better personality and can take advantage of optimal creation of God.

Based on the results of interviews with teachers at SMP/MTs and SMA/MA levels, they are grouped into seven (7) aspects as follows.

Table 1. Integration Pattern Biology and Science Learning with Islamic Sciences

No	Aspects of Integration	Descriptions
1	<i>Belief</i>	Having the belief that all the creation of living things and the universe, Allah is the creator.
2	<i>Amazing</i>	Explain the awe of Allah's creation and the bioprocess of living things.
3	<i>Humble</i>	Explain the attitude of humility towards the greatness of God.
4	<i>Thank God/ Grateful</i>	Explain gratitude for God's creation and the bioprocess of living things.
5	<i>Motivation</i>	Explain to have the motivation to study God's creation and the bioprocess of living things as well as motivation for a better lifestyle
6	<i>Islamic Knowledge Connecting</i>	Connecting biology and science material with Islamic sciences such as the study of the Qur'an, hadith, and other Islamic sciences.
7	<i>Self Awareness</i>	Realized that with the grace that God has given me, it is to have a better personality in terms of maintaining, caring for, repairing, and utilizing the results of God's creation optimally and wisely.

The form of integration of biology and science learning when viewed with the achievement of the learning process and learning outcomes Bloom's Taxonomy can be categorized into two main aspects, namely the first affective aspects such as beliefs, humility, motivation, self-awareness, and so on. The two cognitive aspects are in the form of connecting scientific knowledge and Islamic knowledge. The psychomotor aspect or skills are often known as part of the development of aspects of knowledge and attitudes such as presentation skills connecting science and Islamic knowledge or making works/products oriented to the integration between science and Islam.

The affective aspect of Bloom's Taxonomy is often known as the attitude aspect. Based on the terminology, the affective aspect has a broader meaning than attitude. In English, attitude is often defined in terms of attitude. According to Krathwohl, D.R., Bloom, B.S. & Masia, (1964) explained that affective is something related to emotional things, such as feelings, values, appreciation, enthusiasm, motivation, and attitudes. Therefore, the affective aspect can be interpreted as personality, because it is related to feelings and inherent values.

Efforts to build the personality of students according to some psychologists include all thoughts, feelings, behavior, awareness, or unconsciousness such as innate traits. Awareness is a system to determine a perception, thought, feeling, and memory in the individual (Carl Gustav Jung in Alwisol, (2007). The results of teacher respondents' narratives said that learning religious values such as building a sense of gratitude, awareness, and motivation became things that could be applied to learning in public schools, with heterogeneous student religious characteristics. Therefore, it is important to introduce students to self-awareness as individual units, social beings, and creatures who have divinity.

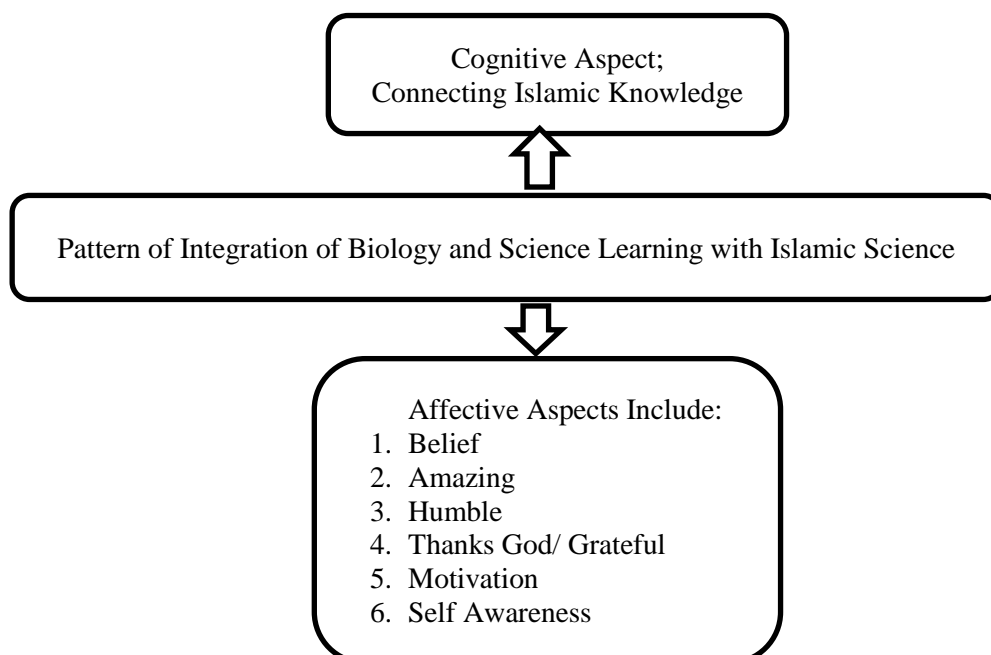


Figure 1. Pattern integration of biology and science learning with Islamic Sciences

Based on figure 1, it can be concluded that the integration of Biology and Science learning with Islamic science includes two domains in the Affective and Cognitive aspects. Therefore, in the context of learning the teacher can choose the integration of various affective and cognitive aspects. If it relates to the cognitive aspect, it can be related to the

interpretation of science or linking with the sources of the Qur'an, Hadith, and other relevant Islamic knowledge. Scientific information in the Quran can be positioned as a source of inspiration and confirmation. Fogarty (1991) uses the term integrated approach as a way to integrate the curriculum through interdisciplinary relationships and between learning materials.

The integration of science and Islam is strongly influenced by the opinion of Ian G. Barbour who explains the relationship between science and religion in the book "When Science Meets Religion. His opinion was present when there was tension between the clergy and scientists. He gives a type of public view of the relationship between science and religion, including the first conflict, namely science and religion have conflicting concepts. The two independents, namely religion and science, have separate concepts, issues, and study methods. The third dialogue is to provide an opportunity for religion and science to give each other views on solving problems. Fourth, integration is looking for common ground on conflicting views between religion and science (Barbour, 2000). Mansour (2015) explains that subjects between science teachers and religion teachers currently do not view them as conflicts.

Minarno (2017) explained that the integration of Science-Islam in Biology learning can be done with two kinds of models, namely: (1) Al-Qur'an Integration Model as a Source of Inspiration, namely placing the Qur'an at the beginning of learning as an umbrella of knowledge or a source of inspiration. science or the main reference source which is further explained by various phenomena in science. (2) Al-Qur'an Integration Model as a Source of Confirmation, namely conducting critical analysis/discussion of phenomena in science, which is then confirmed with the Qur'an, in the sense that findings in science are clarifying what has been stated by the Qur'an. Both models can be used simultaneously and synergize in Biology learning

A teacher who provides biology lessons with the integration of biology and Islam is not only related to the verses of the Qur'an but also can relate to a sense of admiration for God's creation. Teachers who teach Biology with Islamic Sciences can provide a stimulus as in life at the cellular level, not just like a vacuum, but also has various organelles/cell components and has a very complex and systematic process. It is hoped that this will create an attitude of admiration and gratitude for the creation of very small cells.

Abdullah (2006) explained there must be an effort to dialogue three sciences, namely *haftarah an-nash* (religious science based on texts), *hadlarah al-ilm* (social sciences

and natural sciences), and hadlarah al-falsafah. (ethical-philosophical science). If not, the three sciences experience isolation and are believed to be a source of contemporary world problems such as environmental, economic, morality, religiosity, and other crises. Shane (2019) explains that the general idea is that scientists and scientific organizations should work together with religious individuals and institutions to overcome environmental problems and injustice as the limitations of science in describing human thought, behavior, and morality.

Arguments in learning that link across disciplines is important so that students are smarter in distinguishing between arguments that are still confusing (Guilfoyle et al., 2021). Jamaludin & Budhi (2021) explained the development of Biology and Science learning development based on the integration of Islamic Science in the Human Digestive System Material as follows in Table 2.

Table 2. Examples of developing the integration of biology and science learning with Islamic science

No	Aspects of Integration	Example Description of Learning
1	<i>Belief</i>	Have the belief that all processes of digestion of food are regulated by Allah, Allah as the creator.
2	<i>Amazing</i>	Explain the sense of wonder that there are food digestions that need to be ordered, such as in the mouth, and some that don't need to be ordered, such as the small intestine and large intestine.
3	<i>Humble</i>	Explain humility, that humans can experience digestive disorders because they are infected by small bacteria.
4	<i>Thank God</i>	Give an explanation of gratitude for the digestive process that goes well without any enzymatic disturbances.
5	<i>Motivation</i>	Provide an explanation to have the motivation to maintain good digestive health with slogans such as "love the stomach"
6	<i>Islamic Knowledge Connecting</i>	<p><i>"And eat lawful and good food (they) from what has been provided for you and fear Allah and you believe in Him (Surah Al-Maidah: 88)"</i></p> <p>The Prophet's recommendation to chew food in large quantities, one narration mentions chewing each mouthful of food 30-50 times, so that it becomes soft and passes through the throat without difficulty. This is very helpful for mechanical digestion in the stomach as well as enzymatic digestion.</p> <p>Another narration is also mentioned that "the source of the disease in the stomach, then the stomach is a storehouse of disease and fasting is the cure (H.R Muslim)". This gives a lesson that the digestive system also needs to be taken care</p>

	of properly.
7 <i>Self Awareness</i>	Realizing that Allah created the organs in the body has a vital role in the process of digestion of food. One organ that does not function optimally will cause digestive system disorders such as bile problems which will affect fat digestion. Therefore we must maintain a good diet and lifestyle.

Teachers in carrying out biology learning by integrating Islamic Science need to pay attention to several principles so that the learning process can take place optimally and to the 2013 curriculum policy

1. Biology and science learning materials are adapted to basic competencies.

The teacher in providing learning materials is adjusted to the scope and depth of the Basic Competencies specified in the syllabus. This is so that student learning outcomes are by the provisions of basic competencies, core competencies, and graduation standards set out in the Content Standards.

2. Linking knowledge of biology and science with Islamic knowledge.

The form of learning activities that show the integration of biology and Islam is by linking Biology learning with verses from the Qur'an, Hadith, or other Islamic sciences. This principle is very appropriate for schools that have an Islamic background. Biology learning that is integrated with Islam, gives meaning to verses of the Qur'an and Hadith that have clear information or have received detailed explanations from the science of interpretation and science of hadith. In the content of the Qur'an and Hadith, some verses provide detailed explanations of biological/scientific materials such as verses about the process of human creation, but there are also verses of the Qur'an that explain in general or also provide information signal.

3. Linking knowledge of biology and science with aspects of attitude.

Biology learning that is integrated with Islam can provide Islamic values that can develop aspects of attitudes including spiritual attitudes. Biology material related to the process of creating living things and bioprocesses provides the potential for inculcating attitudes in the form of belief in creation, admiration for creation, humility that there is the greatness of God Almighty, gratitude for all the gifts that God has given, gratitude, motivation, and belonging. self-awareness. The principle of learning biology and science by linking it with spiritual and social attitudes is also very suitable to be applied to schools with different religious backgrounds.

4. Accommodating various learning strategies

Learning biology and science that is integrated with Islam can accommodate various kinds of learning strategies, both approaches, models, methods, and learning techniques used.

Faizin (2017) explained that the implementation of the Integration Paradigm in Scientific Tafsir that the integration of the Qur'an and science in Epistemological Tafsir Ilmi there are 3 aspects as follows.

1) Scientific Interpretation: Between Scientific Interpretation and Scientific Integration

Scientific interpretation (al-tafsir al-'ilmi/ scientific exegesis).

Muhammad Husain al-Dzahabi is defined as a discussion of the scientific aspects contained in the Qur'an and efforts to explain the various knowledge and thoughts contained in it. According to al-Dzahabi's view, scientific interpretation is understood as an effort to understand the Qur'an through scientific findings, either inductively or deductively (Faizin, 2017).

The view of scientific interpretation is an integrative approach, between the verses of the Qur'an and scientific findings. In principle, this model is not a problem because dynamic science has relevance to the verses of the Qur'an. Although in the end, the claim of absolute truth remains in the scriptures while the truth of science is relative. Both scientists and scholars must argue that scientific interpretation is not to justify relative truth with absolute truth or scientific interpretation is not to force the interpretation of the Qur'an as if it is by scientific findings (Lajnah Pentashihan Mushaf al-Qur'an, 2012).

2) Theology as the basis of integration

Nasr (1970) explained that he wanted to offer theology-based scientific integration. Science is always rooted in God, where it is placed in the principle of monotheism which shows the unity of the universe because basically, all knowledge comes from God. All Islamic Sciences aim to demonstrate the unity and good relationship of all that exists so that in contemplating the cosmos, man is always directed to the unity of the divine principle. Therefore, to understand the functional relationship across sciences, humans must place divine principles as an integral part that cannot stand alone.

God is placed in a central position in the study of scientific interpretation. Everything related to the discussion is always related to God with all forms of His attributes and majesty (Faizin, 2017). The integration of science between biology science and Islamic science has an aspect to instilling faith in Allah SWT. Learning about the diversity of living

things, physiological systems that exist in the bodies of creatures and the solar system is essential that Allah SWT created and regulates all mechanisms. The task of scientists and educators is to explain the mechanisms that occur scientifically and scientifically.

3) From Theology To Ethics

One of the important goals of scientific integration in Islam apart from ending the dichotomy of science is to give birth to a scientific ethic so that it is not value-free. Almost all the scientists mentioned above voiced this. This departs from the phenomenon of Western science which is not in favor of the issue of morality and ethics of science which is claimed to be value-free and loaded with various interests, including political, economic, military, and other interests. In contrast to Islamic science, according to Sardar, both results, means, goals, processes, and methods are always in the vortex of the ethical system (Sardar & Masood., 2006).

The combination of the concept of monotheism, caliphate, and modern science has a functional relationship in presenting these ethical values. Ethics is presented as an effort to give value to science (free value), and practically it has the function to maintain human relations with themselves, with fellow humans, with the Creator.

Based on the explanation above, it shows that the integration of science and Islamic science includes 3 aspects, namely 1) scientific interpretation, namely between scientific interpretation in the review of the Qur'an and hadith with science, 2) Theology as the basis of integration and 3) from theology to ethics. The relationship between science and Islamic science illustrates that both have a dialogue space to complement each other within the framework of science. Therefore, teachers have several aspects that can be an alternative in the application of the integration of science and Islamic science in learning practice.

In essence, the study of Biology has a strong relationship with religious knowledge. Biology learning is not only seen as a monodisciplinary that stands alone but axiologically it has a value system that is related to various other disciplines. According to Yudianto (2005), science education for civilized human civilization has several value systems including practical values, intellectual values, socio-political values, educational values, and religious values.

Learning from the integration form of science and Islam in the scientific interpretation book published by the Ministry of Religion has three forms of integration paradigm including, First, scientific interpretation as a pattern of integration of religion and science, Second theology as the basis of integration, and thirdly scientific interpretation as

an effort to present ethical values. The pattern of integration of religion and science in scientific interpretation makes religion the central basis for the combination of the text of the Qur'an and the universe through the reading of interpretation and science. The metaphysical side is presented to present the greatness of Allah SWT. The values of monotheism, science and the caliphate have an integral relationship and become an instrument for the birth of ethical values (Faizin, 2015).

Golshani (2005) said several Islamic views that affect general knowledge and natural sciences include the following:

1. Oneness of God/ at Tawhid (The unicity of god)

Oneness (tawhid) is a basic concept in Islam. This affects the unity in creation, the interrelationships between all components that have an impact on the unity of science. The diversity of scientific disciplines so far will give a harmonious picture. Many verses in the Qur'an tell about the unity of the universe as in QS Al Anbiya: 22 If in both (the heavens and the earth) there were gods besides Allah, both of them would have perished. Glory be to Allah who owns the Throne of what they characterize.

2. Faith in supernatural realities and limitations of human knowledge.

Islamic society believes that the process of creating the universe is carried out by the Creator and humans have limitations in mastering all knowledge.

3. Believe in the purpose of the creation of the universe (belief in a purposeful universe)

The process of creating this universe has a purpose. Allah created everything on earth and in the heavens not in vain but for a clear purpose.

4. Commitment to moral values

Al-Quran has a function to pay attention to the commitment to moral values, such as the value of honesty brought by the prophet Muhammad saw. The educational process in the view of Islam is expected to be in harmony with the ethics of education, therefore education requires a moral value and responsibility.

The universe as an object of science is not value-free. Science has value and a noble purpose. If science is used for good purposes, it will produce well for society (Mahmud 1996 in Zein, 2014). Based on this, science learning has values that can be developed for the formation of the character of students. Learning science and biology is not enough to teach a conceptual rule, but it must also be able to teach about spiritual, moral, and character values. So that science and biology learning can lead to national education goals of faith and noble character and it supports the achievement of spiritual, social, knowledge,

and skill competencies

CONCLUSION

Biology and science learning based on the integration of Islamic science has an integration pattern related to attitudes (affective) and knowledge (cognitive). Attitudes have a pattern of development such as belief, admiration, humility, gratitude, motivation, and self-awareness. As for knowledge, there is a pattern of connecting scientific knowledge with Islamic knowledge both sourced from the Qur'an and Hadith as well as other Islamic knowledge. Biology and science learning have values that can be developed for the formation of students' character. The learning does not only teach a conceptual rule but also must be able to teach about spiritual, moral, and character values.

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